

What is claimed is:

1. A system for refilling a fuel cell, the system comprising:  
a main container comprising at least one movable fuel container, at least one movable electrolyte container, and at least one spent fuel chamber; and  
a valve which regulates or controls fluid flow between the main container and a fuel cell and vice versa.
2. The system of claim 1, wherein the at least one movable fuel container comprises a bellows.
3. The system of claim 1, wherein the at least one movable fuel container comprises an axially compressible container.
4. The system of claim 1, wherein the at least one movable fuel container comprises a variable volume container.
5. The system of claim 1, wherein the at least one movable electrolyte container comprises a bellows.
6. The system of claim 1, wherein the at least one movable electrolyte container comprises an axially compressible container.
7. The system of claim 1, wherein the at least one movable electrolyte container comprises a variable volume container.
8. The system of claim 1, further comprising an outer sleeve movably mounted to the main container.

9. The system of claim 1, wherein the main container comprises an outer wall which surrounds the at least one movable fuel container, the at least one movable electrolyte container, and the at least one spent fuel chamber.

10. The system of claim 1, wherein the at least one spent fuel chamber comprises a first spent fuel chamber and a second spent fuel chamber.

11. The system of claim 10, wherein the at least one movable fuel container is movable between a position inside the first spent fuel chamber to a position outside the first spent fuel chamber.

12. The system of claim 11, wherein the at least one movable electrolyte container is movable between a position inside the second spent fuel chamber to a position outside the second spent fuel chamber.

13. The system of claim 12, further comprising a separating wall arranged between the first and second spent fuel chambers.

14. The system of claim 10, wherein the at least one movable electrolyte container is movable between a position inside the second spent fuel chamber to a position outside the second spent fuel chamber.

15. The system of claim 1, further comprising a piston coupled to the at least one movable fuel container, wherein the piston is movable within the at least one spent fuel chamber.

16. The system of claim 1, further comprising a piston coupled to the at least one movable electrolyte container, wherein the piston is movable within the at least one spent fuel chamber.

17. The system of claim 1, wherein the at least one spent fuel chamber comprises a first spent fuel chamber and a second spent fuel chamber, and further comprising:

a first piston coupled to the at least one movable fuel container, wherein the first piston is movable within the first spent fuel chamber; and

a second piston coupled to the at least one movable electrolyte container, wherein the second piston is movable within the second spent fuel chamber.

18. The system of claim 1, further comprising fuel arranged within the at least one movable fuel container and electrolyte arranged within the at least one movable electrolyte container.

19. The system of claim 1, wherein the valve comprises a first part which is coupled to the main container and a second part which is coupled to the fuel cell.

20. The system of claim 19, wherein the first part is rotatably mounted to the second part.

21. The system of claim 19, wherein the first part is releasably connectable to the second part.

22. The system of claim 21, wherein, when the first part is disconnected from the second part, the first part prevents fluid from exiting out of the main container and the second part prevents fluid from exiting out of the fuel cell.

23. The system of claim 1, wherein the valve comprises a closed position and an opened position.

24. The system of claim 1, wherein the valve comprises a plurality of exit ports which are in fluid communication with the fuel cell.

25. The system of claim 1, further comprising a securing cap that secures the main container to the valve.

26. A method of refilling a fuel cell with a valve and a main container that comprises at least one movable fuel container, at least one movable electrolyte container, and at least one spent fuel chamber, the method comprising:

moving the at one movable fuel container and the at least one movable electrolyte container to cause spent fuel from fuel cell to enter the at least one spent fuel chamber.

27. The method of claim 26, further comprising controlling fluid flow between the main container and a fuel cell.

28. The method of claim 26, further comprising, after the moving, compressing the least one of the at one movable fuel container and the at least one movable electrolyte container to cause fuel and electrolyte to enter into the fuel cell.

29. The method of claim 26, further comprising, after the moving, forcing fuel and electrolyte to enter into the fuel cell from the least one of the at one movable fuel container and the at least one movable electrolyte container.

30. The method of claim 29, wherein the at least one movable fuel container comprises a bellows container.

31. The system of claim 29, wherein the at least one movable fuel container comprises a axially compressible container.

32. The method of claim 26, further comprising, before the moving, coupling one portion of the valve to the main container and another portion of the valve to the fuel cell.

33. The method of claim 26, further comprising, before the moving, placing the valve in fluid communication with the main container and the fuel cell.

34. The method of claim 26, further comprising, before the moving, coupling one portion of the valve to the main container and another portion of the valve to the fuel cell and thereafter connecting the one portion to the another portion.

35. The method of claim 34, further comprising controlling fluid flow between the main container and a fuel cell and vice versa with the valve.

36. The method of claim 26, further comprising, before the moving, securely attaching a male portion of the valve to the main container and securely attaching a female portion of the valve to the fuel cell and thereafter connecting the male portion and the female portion to each other.

37. The method of claim 36, further comprising, after the moving, disconnecting the male portion of the valve from the female portion of the valve, and preventing, with the male portion, spent fuel from exiting the main container and preventing, with the female portion, fuel and electrolyte from exiting the fuel cell.

38. A cartridge for refilling a fuel cell, the cartridge comprising:  
a main container comprising at least one movable fuel container, at least one movable electrolyte container, and at least one spent fuel chamber; and  
a device that moves the at least one movable fuel container and at least one movable electrolyte container.

39. The cartridge of claim 38, wherein the device comprises an outer sleeve which is coupled to the at least one movable fuel container and the at least one movable electrolyte container.

40. The cartridge of claim 38, wherein the at least one movable fuel container comprises a bellows.

41. The cartridge of claim 38, wherein the at least one movable fuel container comprises an axially compressible container.

42. The cartridge of claim 38, wherein the at least one movable fuel container comprises a variable volume container.

43. The cartridge of claim 38, wherein the at least one movable electrolyte container comprises a bellows.

44. The cartridge of claim 38, wherein the at least one movable electrolyte container comprises an axially compressible container.

45. The system of claim 38, wherein the at least one movable electrolyte container comprises a variable volume container.

46. The cartridge of claim 38, wherein the at least one movable fuel container comprises an outer bellows container and an inner bellow container.

47. The cartridge of claim 38, wherein the main container comprises an outer wall which surrounds the at least one movable fuel container, the at least one movable electrolyte container, and the at least one spent fuel chamber.

48. The cartridge of claim 38, wherein the at least one spent fuel chamber comprises a first spent fuel chamber and a second spent fuel chamber.

49. The cartridge of claim 48, wherein the at least one movable fuel container is movable between a position inside the first spent fuel chamber to a position outside the first spent fuel chamber.

50. The cartridge of claim 49, wherein the at least one movable electrolyte container is movable between a position inside the second spent fuel chamber to a position outside the second spent fuel chamber.

51. The cartridge of claim 50, further comprising a separating wall arranged between the first and second spent fuel chambers.

52. The cartridge of claim 49, wherein the at least one movable electrolyte container is movable between a position inside the second spent fuel chamber to a position outside the second spent fuel chamber.

53. The cartridge of claim 38, further comprising a piston coupled to the at least one movable fuel container, wherein the piston is movable within the at least one spent fuel chamber.

54. The cartridge of claim 38, further comprising a piston coupled to the at least one movable electrolyte container, wherein the piston is movable within the at least one spent fuel chamber.

55. The cartridge of claim 38, wherein the at least one spent fuel chamber comprises a first spent fuel chamber and a second spent fuel chamber, and further comprising:

a first piston coupled to the at least one movable fuel container, wherein the first piston is movable within the first spent fuel chamber; and

a second piston coupled to the at least one movable electrolyte container, wherein the second piston is movable within the second spent fuel chamber.

56. The cartridge of claim 38, further comprising fuel arranged within the at least one movable fuel container and electrolyte arranged within the at least one movable electrolyte container.

57. The cartridge of claim 38, further comprising a valve coupled to the main container.

58. The cartridge of claim 57, wherein the valve comprises first and second parts and wherein the first is disconnectable from a second part, whereby the first part prevents fluid from exiting out of the main container and the second part prevents fluid from exiting out of a fuel cell.

59. The cartridge of claim 57, wherein the valve comprises a closed position and an opened position.

60. The cartridge of claim 57, wherein the valve comprises a plurality of exit ports which are adapted for fluid communication with the fuel cell.



61. The cartridge of claim 38, further comprising a valve and a securing cap that secures the main container to the valve.

62. A system for refilling a fuel cell, the system comprising:  
a main container comprising at least one movable fuel container, at least one movable electrolyte container, and two spent fuel chambers; and  
a valve which regulates or controls fluid flow between the main container and a fuel cell and vice versa;  
the valve comprising a first portion coupled to the main container and a second portion coupled to the fuel cell,  
wherein the first portion is removably connectable to the second portion.

63. The system of claim 62, wherein the at least one movable fuel container comprises a bellows.

64. The system of claim 62, wherein the at least one movable fuel container comprises an axially compressible container.

65. The system of claim 62, wherein the at least one movable fuel container comprises an outer bellows and an inner bellows.

66. The system of claim 62, wherein the at least one movable electrolyte container comprises a bellows.

67. The system of claim 62, wherein the at least one movable electrolyte container comprises a axially compressible container.

68. The system of claim 62, wherein the at least one movable electrolyte container comprises a variable volume container.

69. The system of claim 62, further comprising an outer sleeve movably mounted to the main container.

70. The system of claim 62, wherein the main container comprises an outer wall which surrounds the at least one movable fuel container, the at least one movable electrolyte container, and the two spent fuel chambers.

71. The system of claim 62, wherein the two spent fuel chambers are configured to retain therein the at least one movable fuel container and the at least one movable electrolyte container.

72. The system of claim 62, wherein the at least one movable fuel container is movable between a position inside one of the two spent fuel chambers to a position outside thereof.

73. The system of claim 62, wherein the at least one movable electrolyte container is movable between a position inside one of the two spent fuel chambers to a position outside thereof.

74. The system of claim 62, further comprising a separating wall arranged between the two spent fuel chambers.

75. The system of claim 62, wherein each of the at least one movable fuel and electrolyte containers are movable between a position inside the two spent fuel chambers to a position outside thereof.

76. The system of claim 62, further comprising a piston coupled to the at least one movable fuel container, wherein the piston is movable within one of the two spent fuel chambers.

77. The system of claim 62, further comprising a piston coupled to the at least one movable electrolyte container, wherein the piston is movable within one of the two spent fuel chambers.

78. The system of claim 62, further comprising:  
a first piston coupled to the at least one movable fuel container, wherein the first piston is movable within one of the two spent fuel chambers; and  
a second piston coupled to the at least one movable electrolyte container, wherein the second piston is movable within another of the two spent fuel chambers.

79. The system of claim 62, further comprising fuel arranged within the at least one movable fuel container and electrolyte arranged within the at least one movable electrolyte container.

80. The system of claim 62, wherein the first portion is non-removably connected to the main container and the second portion is non-removably connected to the fuel cell.

81. The system of claim 62, wherein the first portion is securely and sealingly connected to the main container and the second portion is securely and sealingly connected to the fuel cell.

82. The system of claim 62, wherein the first portion is rotatably mounted to the second portion.

83. The system of claim 62, wherein, when the first portion is disconnected from the second portion, the first portion prevents fluid from exiting out of the

main container and the second portion prevents fluid from exiting out of the fuel cell.

84. The system of claim 62, wherein the valve comprises a closed position and an opened position.

85. The system of claim 62, wherein the valve comprises a plurality of exit ports which are in fluid communication with the fuel cell.

86. A method of refilling a fuel cell with a valve and a main container that comprises an outer sleeve, at least one movable fuel container, at least one movable electrolyte container, and two spent fuel chambers, the method comprising:

moving an outer sleeve to cause the at least one movable fuel container and the at least one movable electrolyte container to cause spent fuel from fuel cell to enter the two spent fuel chambers; and

forcing fuel and electrolyte to enter into the fuel cell from the at least one movable fuel container and the at least one movable electrolyte container.

87. The method of claim 86, wherein the forcing comprises compressing the at least one movable fuel container and the at least one movable electrolyte container to cause fuel and electrolyte to enter into the fuel cell.

88. The method of claim 86, further comprising controlling fluid flow between the main container and a fuel cell with the valve.

89. The method of claim 86, wherein the at least one movable fuel container comprises a bellows container.

90. The method of claim 86, wherein the at least one movable fuel container comprises a axially compressible container.

91. The method of claim 86, further comprising, before the moving, coupling one portion of the valve to the main container and another portion of the valve to the fuel cell.

92. The method of claim 86, further comprising, before the moving, placing the valve in fluid communication with the main container and the fuel cell.

93. The method of claim 86, further comprising, before the moving, coupling one portion of the valve to the main container and another portion of the valve to the fuel cell and thereafter connecting the one portion to the another portion.

94. The method of claim 93, further comprising controlling fluid flow between the main container and a fuel cell and vice versa with the valve.

95. The method of claim 86, further comprising, before the moving, securely attaching a male portion of the valve to the main container and securely attaching a female portion of the valve to the fuel cell and thereafter connecting the male portion and the female portion to each other.

96. The method of claim 95, further comprising, after the moving, disconnecting the male portion of the valve from the female portion of the valve, and preventing, with the male portion, spent fuel from exiting the main container and preventing, with the female portion, fuel and electrolyte from exiting the fuel cell.

97. A cartridge for refilling a fuel cell, the cartridge comprising:

a main container comprising at least one movable and compressible fuel container, at least one movable and compressible electrolyte container, and two spent fuel chambers; and

a device that moves the at least one movable and compressible fuel and electrolyte containers from a position within the two spent fuel chambers to a position at least partially outside thereof.

98. The cartridge of claim 97, wherein the device comprises an outer sleeve which is coupled to the at one movable and compressible fuel and electrolyte containers.

99. The cartridge of claim 97, wherein the at least one movable and compressible fuel container comprises a bellows.

100. The cartridge of claim 97, wherein the at least one movable and compressible fuel container comprises an axially compressible container.

101. The cartridge of claim 97, wherein the at least one movable and compressible fuel container comprises a variable volume container.

102. The cartridge of claim 97, wherein the at least one movable and compressible electrolyte container comprises a bellows.

103. The cartridge of claim 97, wherein the at least one movable and compressible electrolyte container comprises an axially compressible container.

104. The system of claim 97, wherein the at least one movable and compressible electrolyte container comprises a variable volume container.

105. The cartridge of claim 97, wherein the at least one movable and compressible fuel container comprises an outer bellows container and an inner bellow container.

106. The cartridge of claim 97, wherein the main container comprises an outer wall which surrounds the at least one movable and compressible fuel container, the at least one movable and compressible electrolyte container, and the two spent fuel chambers.

107. The cartridge of claim 97, wherein the two spent fuel chambers comprises a first spent fuel chamber and a second spent fuel chamber.

108. The cartridge of claim 107, further comprising a separating wall arranged between the first and second spent fuel chambers.

109. The cartridge of claim 97, further comprising a piston coupled to the at least one movable and compressible fuel container, wherein the piston is movable within one of the two spent fuel chambers.

110. The cartridge of claim 97, further comprising a piston coupled to the at least one movable and compressible electrolyte container, wherein the piston is movable within one of the two spent fuel chambers.

111. The cartridge of claim 97, further comprising:

a first piston coupled to the at least one movable and compressible fuel container, wherein the first piston is movable within one of the two spent fuel chambers; and

a second piston coupled to the at least one movable and compressible electrolyte container, wherein the second piston is movable within another of the two spent fuel chambers.

112. The cartridge of claim 97, further comprising fuel arranged within the at least one movable fuel container and electrolyte arranged within the at least one movable electrolyte container.

113. The cartridge of claim 97, further comprising a valve coupled to the main container.

114. The cartridge of claim 113, wherein the valve comprises first and second parts and wherein the first is disconnectable from a second part, whereby the first part prevents fluid from exiting out of the main container and the second part prevents fluid from exiting out of a fuel cell.

115. The cartridge of claim 113, wherein the valve comprises a closed position and an opened position.

116. The cartridge of claim 113, wherein the valve comprises a plurality of exit ports which are adapted for fluid communication with the fuel cell.

117. The cartridge of claim 97, further comprising a valve and a securing cap that secures the main container to the valve.